

WHAT IS CLAIMED IS:

1.           An image pick-up device comprising:  
              an image sensor having a plurality of  
photodiodes arranged in a grid to store the charge by  
photoelectric conversion of the incident light;  
              a driving means to drive said image sensor in  
such a manner as to read at least two imaging signals  
having different exposure time by differentiating the  
timing of reading said charge of said photodiodes in  
according with a corresponding line; and  
              a signal processing means to generate an  
image signal by synthesizing and processing at least  
two imaging signals having different exposure time.
2.           An image pick-up device according to Claim 1,  
              wherein said driving means drives said image  
sensor in such a manner as to read two imaging signals  
having different exposure time by differentiating the  
read timing between the odd lines and the even lines of  
said photodiodes.
3.           An image pick-up device according to Claim 1,  
              wherein said driving means drives said image  
sensor in such a manner as to read a long-time exposed  
imaging signal having a long exposure time and a short-  
time exposed imaging signal having a short exposure  
time from said image sensor, and  
              wherein said signal processing means  
generates an image signal by synthesizing and  
processing a signal representing the low-brightness

portion of said long-time exposed imaging signal and a signal representing the high-brightness portion of said short-time exposed imaging signal.

4. An image pick-up device according to Claim 1, wherein said driving means drives said image sensor in such a manner as to read at least two imaging signals having different exposure time within one field period.

5. An image pick-up device according to Claim 1, wherein said image sensor includes a vertical CCD means to vertically transfer the charge read from said photodiodes and a horizontal CCD means for two lines to horizontally transfer the charge transferred by said vertical CCD means, and

wherein said driving means drives said image sensor in such a manner as to read two imaging signals having different exposure time from each of the two lines of said horizontal CCD means.

6. An image pick-up device according to Claim 2, wherein said signal processing means corrects the deviation of the coordinates between an odd line and an even line when synthesizing said odd line and said even line.

7. An imaging method comprising the steps of:  
reading a long-time exposed imaging signal having a long exposure time from the odd lines (or the even lines) of an image sensor;

reading a short-time exposed imaging signal

having a short exposure time from the even lines (or the odd lines) of said image sensor; and

generating an image signal by synthesizing and processing a signal representing the low-brightness portion of said long-time exposed imaging signal and a signal representing the high-brightness portion of said short-time exposed imaging signal.

8. An image pick-up device comprising an imaging sensor means to convert light into electrical energy, an image sensor driving means for driving said image sensor means, an A/D conversion means to sample the imaging signal read from said image sensor means and converting said imaging signal into a digital imaging signal, and a digital signal processing means to generate a digital image signal by extracting the information on the color and the brightness from said digital imaging signal;

wherein said image sensor means has the number of effective pixels in vertical direction at least twice as many as the number of effective lines of the digital image signal output from said image pick-up device, said image sensor means changing the exposure time in vertical direction; and

wherein said digital signal processing means distributes the imaging signals read from said image sensor means into groups of imaging signals obtained with the same exposure time, and thus generates a digital image signal representing at least two digital

images, while at the same time adding said digital image signals to each other.

9.           An image pick-up device according to Claim 8, wherein said image sensor means is a CCD image sensor means including a photodiode means to convert light into electrical energy and store the electrical energy as charge, a vertical CCD means to vertically transfer the charge read from said photodiode means, a horizontal CCD means to horizontally transfer the charge transferred thereto from said vertical CCD means, and an output amplifier means to convert the current change generated by the movement of the charge transferred from said horizontal CCD means, into a voltage change.

10.           An image pick-up device according to Claim 9, wherein the number of vertical pixels of said CCD image sensor means at least four times as many as the number of vertical pixels for the digital image signal generated by said digital signal processing means,

              wherein the timing of reading the stored charge on a vertical CCD from four successive vertical lines of photodiodes is controlled independently, and

              wherein said digital image signals representing at least two digital images are generated in such a manner that after reading the charge on the vertical CCDs from the photodiodes to switch the charge storage time of said CCD image sensor means by said CCD

image sensor driving means for each two lines of said digital image signals, an imaging signal with the charge stored in mixed pixels having the same storage time is read thereby to obtain imaging signals having different exposure time for each line, said imaging signals being separated for each line having the same exposure time thereby to generate a digital image signal having individual color information and brightness information.

11. An image pick-up device according to Claim 8, wherein said digital image signal having a wide dynamic range further has added thereto an interpolation signal newly generated by signal interpolation to correct the deviation of the coordinates of said two digital image signals on said CCD image sensor means.

12. An image pick-up device according to Claim 8, wherein said CCD image sensor means includes two lines of horizontal CCDs to acquire two imaging signals including an imaging signal having a long exposure time and an imaging signal having a short exposure time at the same time in one horizontal transfer period,

wherein two systems of said digital signal processing means are provided to generate digital image signals representing the brightness information and the color difference information, and

wherein after processing said two imaging signals are processed in parallel, two image signals

are added to each other thereby to generate a new digital image signal including two digital image signals having different exposure time superposed one on the other.

13. An image pick-up device according to Claim 8, wherein said image sensor means is a C-MOS image sensor means including a photodiode means to store the electrical energy as a charge converted from light by said image sensor means, a temporary charge storage means associated with said photodiodes arranged in grid form to temporarily store the charge read from said photodiodes, a charge read gate interposed between said temporary charge storage means and an output amplifier, and a gate driving means to control the operation of said charge read gate and the read timing of the charge to said charge read gate, and

wherein the read timing of the charge to said charge read gate is switched in vertical direction thereby to generate at least two images having different exposure time.

14. An image pick-up device comprising an image sensor means to convert light into electrical energy, an image sensor driving means to drive said image sensor means, an A/D conversion means to convert the imaging signal read from said image sensor means into a digital imaging signal, a field memory means to store a field of said digital imaging signal, and a digital signal processing means to generate a digital image

signal by extracting the color and brightness information from said digital imaging signal,

wherein said image sensor means has effective vertical pixels at least twice as many as the effective lines of the digital image signal output by said image pick-up device, the exposure time of said image sensor means is switched in vertical direction thereby to carry out the imaging operation with the exposure time of less than one field and the imaging operation with the exposure time of not less than one field, in parallel to each other, said digital signal processing means operating in such a manner that the imaging signal read from said image sensor means is distributed into groups of image signals obtained with the same exposure time thereby to generate digital image signals representing at least two digital images, and those of said digital images which are obtained with the exposure time of not less than one field are stored in said field memory thereby to prepare and add an image signal having the exposure time of less than one field and an image signal having the exposure time of not less than one field to each other.